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[54] ILLUMINATION OPTICAL APPARATUS
USING DIFFERENT NUMBER OF LIGHT
SOURCES UNDER DIFFERENT EXPOSURE
MODES, METHOD OF OPERATING AND
METHOD OF MANUFACTURING THEREOF

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[57]

ABSTRACT

A diffraction grating is set between a light source and a fly-eye lens composed of a plurality of lens elements rectangular in cross section, and using the zeroth order diffraction beam and a first order diffraction beams emergent from the diffraction grating, a plurality of light source images are formed along the longitudinal direction on the exit plane of each lens element in the fly-eye lens. In a preferred mode the intensity of illumination light on a mask is increased using first and second light sources, and first illumination beam, which is obtained by combining a beam emitted from the first light source and passing through a half prism with a beam emitted from the second light source and reflected by the half prism on a same axis, and a second illumination beam, which is obtained by combining a beam emitted from the first light source and reflected by the half prism with a beam emitted from the second light source and passing through the half prism on a same axis, are made incident into the fly-eye lens as being inclined symmetrically with each other with respect to the optical axis of illumination optical system.

31 Claims, 12 Drawing Sheets

